



Auto-CPP Webcast Presentation

Webcast guidelines

- Close all other programs on your computer
- Ask questions by typing into the “Chat” function on the left window of your screen.
 - Participants’ phones will be muted during the webcast
 - Questions will be addressed during and/or at the end of the webcast presentation
- Reference Materials
 - Auto-CPP Website: <http://drcc.lbl.gov/drcc-6.html>
- Provide feedback through the Exit Survey



Automated Critical Peak Pricing (Auto-CPP) Pilot for Large Facilities

Summer 2006

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**WEBCAST
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drrc.lbl.gov**





Presentation Overview

Objective: To inform the PG&E Account Managers and to seek assistance for recruitment

- Demand-side Management Framework
- Automated Critical Peak Pricing (CPP) Pilot Project Objectives
- Automated CPP Research in 2005
- Plans for 2006
 - *Site Recruitment*
 - *Site Selection Criteria*
 - *Resources*
- Question and Answer

Demand-Side Management Framework

	<i>Efficiency and Conservation (Daily)</i>	<i>Peak Load Management (Daily)</i>	<i>Demand Response (Dynamic Event Driven)</i>
Motivation	<ul style="list-style-type: none"> - Environmental Protection - Utility Bill Savings 	<ul style="list-style-type: none"> - TOU Savings - Peak Demand Charge savings - Grid Protection 	<ul style="list-style-type: none"> - Economic - Reliability - Emergency - Grid Protection
Design	<ul style="list-style-type: none"> - Efficient Shell, Equipment & Systems 	Low Power Design	Dynamic Control Capability*
Operations	<ul style="list-style-type: none"> - Integrated System Operations 	Demand - Limiting Shifting	Demand - Limiting Shifting Shedding
Initiation	Local	Local	Remote

***Prefer closed loop strategies, granular control**

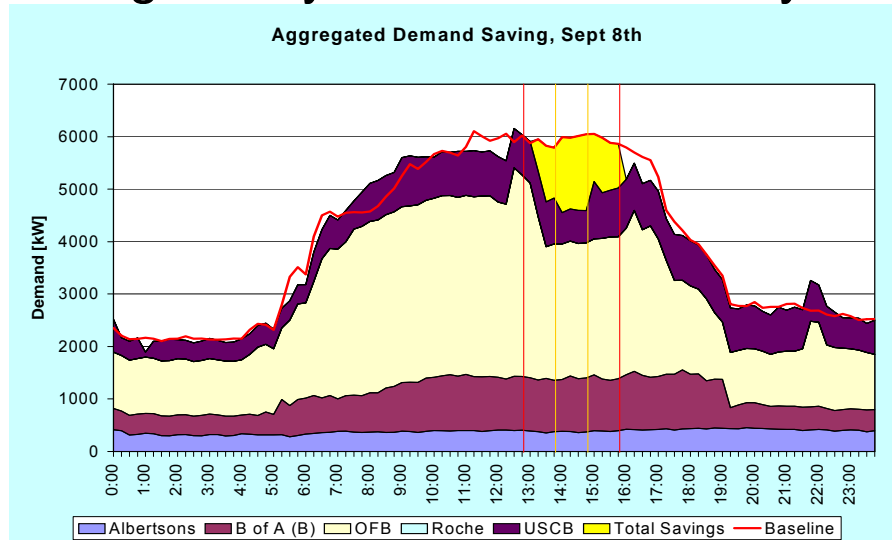


Levels of Automation in DR

- **Manual DR** - potentially labor-intensive human turning off or changing set points at each switch or controller
- **Semi-Automated DR** - pre-programmed demand response strategy initiated by a person via centralized control system
- **Fully-Automated DR** - initiated through receipt of an external communications signal to execute pre-programmed strategies

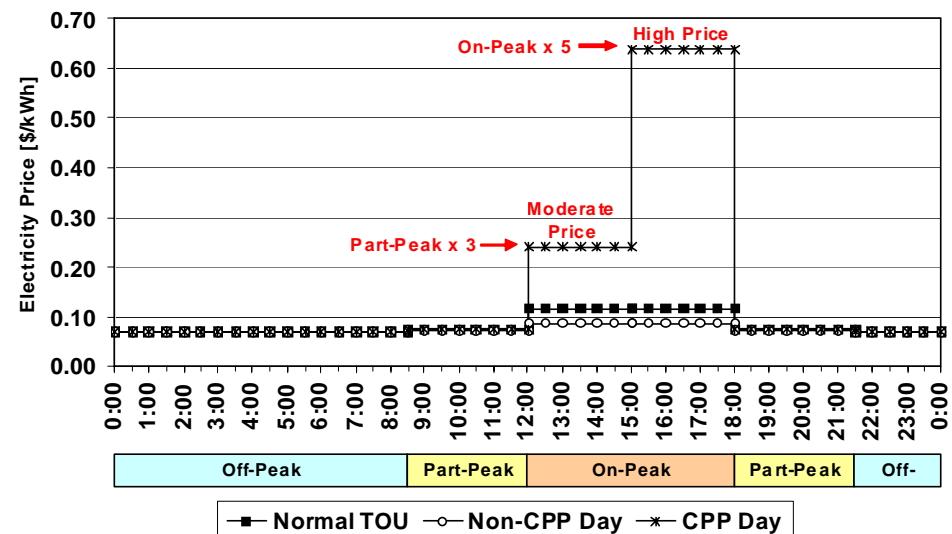
Automated DR Research

- **Goals**
 - Automate DR for large buildings linking EMCS to Price/Signal Server
 - Evaluate feasibility of automated DR and DR strategies
- **2003 Study** – 5 sites had Energy Information Systems
 - Fictitious prices, all XML gateways
- **2004 Study** - 18 (10 Million ft²) sites linked to EIS & EMCS
 - Fictitious prices, XML gateways and Internet Relays



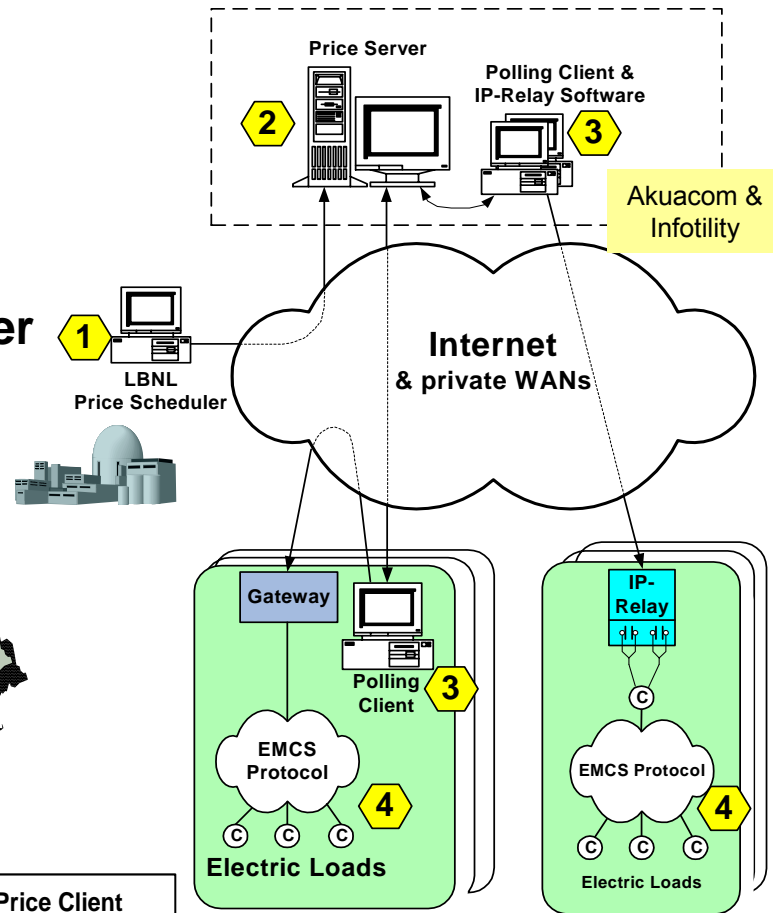
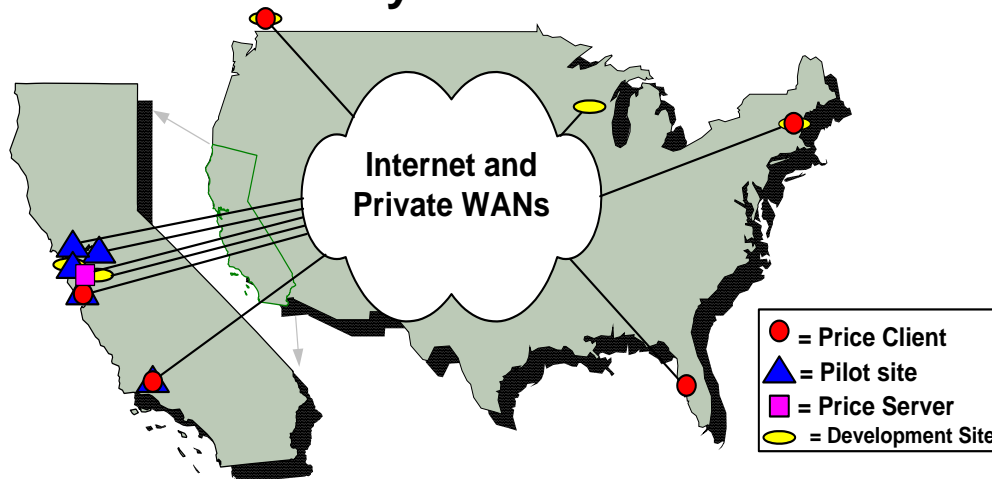
Fully Automated Critical Peak Pricing

- **Objectives of 2005 Automated CPP Study**
 - Evaluate effectiveness of automated notification system for CPP
 - New Price Server for 2005 Study
 - Evaluate which shifting and shedding strategies can be automated
- **Determine occupant and tenant response**
 - Three pre-cooling sites
 - Three occupant comfort sites
 - One Indoor Air Quality (IAQ) site



2003, 2004 and 2005 Automation Systems

1. PG&E or LBNL defines price schedule
2. Price published on LBNL XML (eXtensible Markup Language) server
3. Clients request price from server every minute & send shed commands
4. EMCS carries out shed automatically



Test Sites
C = EMCS Controllers

2003 test was Gateway only
2004 was Gateway or Relay
2005 both

Results on Automated-DR

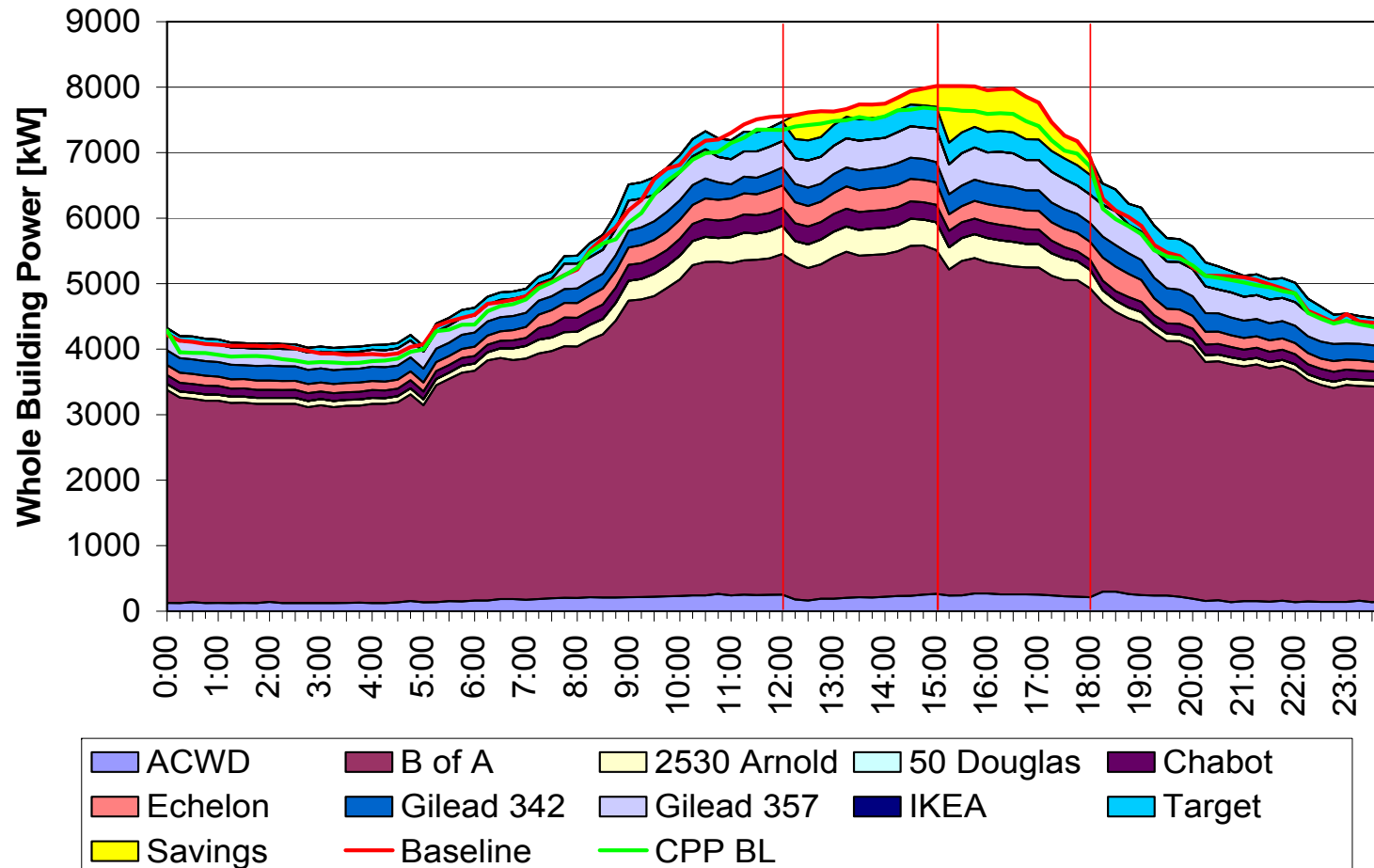
- Established capabilities of current controls and communications with EMCS and XML
- Demonstrated initial design of signaling infrastructure and system capability
- Demonstrated large sheds can take place without complaints
- Demonstrated range of strategies to produce sheds and capabilities needed
- Average reduction 8% among 28 buildings, up to 50%

	Number of sites	Avg. Savings (%)	Max. Savings (%)
2003	5	8	28
2004	18	7	56
2005	12	9	38



Automated Critical Peak Pricing Summer 2005

Sample Results from Sept 29: 8% shed, ~ 1 MW shed, 0.5 W/ft²





Maximum DR from Auto-CPP Tests

		Aug-08	Sep-22	Sep-29	Oct-06	Oct-13	Oct-25	Nov-10	2004	Max
ACWD	Baseline Peak kW			330	253	290	238			330
	Max Shed kW			101	74	83	77			101
B of A	Baseline Peak kW			5311		5163	5053			5053
	Max Shed kW			291		219	552			552
Chabot	Baseline Peak kW		225	308	244	270				308
	Max Shed kW		19	88	36	42				88
2530 Arnold	Baseline Peak kW	505	419	431	404	406	345			505
	Max Shed kW	176	119	90	63	89	40			176
50 Douglas	Baseline Peak kW	381					259			381
	Max Shed kW	95					78			95
Echelon	Baseline Peak kW		334	403	363	359	304			403
	Max Shed kW		115	143	132	117	84			143
Gilead 342	Baseline Peak kW		288	384	289	340	278			288
	Max Shed kW		94	75	45	55	80			94
Gilead 357	Baseline Peak kW			607		455	443			607
	Max Shed kW			150		119	145			150
IKEA	Baseline Peak kW					1982	1803			1982
	Max Shed kW					321	223			321
Oracle	Baseline Peak kW							507		507
	Max Shed kW							65		65
Target	Baseline Peak kW		314	364	328	341	296			341
	Max Shed kW		52	53	60	64	49			64
USPS*	Baseline Peak kW								1483	1483
	Max Shed kW								333	333
Total	Baseline Peak kW	886	1579	8138	1881	9608	9020	507	1483	12189
	Max Shed kW	272	399	992	410	1108	1329	65	333	2182

* 2004 data (Oct-13) is used for USPS because USPS failed to conduct demand shed in 2005.

Total maximum demand and savings potential demonstrated



Analysis of Strategies (32 DR Sites)

		Participation				HVAC														Light, Misc.						
		CA-2003	CA-2004	CA-2005	NY	Global temp. adjustment	Fan-coil unit off	SAT reset	Fan VFD limit	Duct static pres. reset	Fan quantity reduction	Electric humidifier off	CHW temp. reset	CHW current limit	Chiller demand limit	Boiler lockout	Pre-cooling	Extended shed period	Slow recovery	Common area light dim	Office area light dim	Elevator cycling	Anti-sweat heater shed	Fountain pump off	Transfer pump off	Rock crushers off
300 CapMall	Office		•			X			X		X		X													
ACWD	Office			•		X		X		X			X	X		X		X								
Albertsons	Supermarket	•																		X			X			
B of A	Office	•	•	•				X	X	X			X	X												
Chabot Museum	Museum			•		X											X									
Cal EPA	Office		•							X										X	X					
CETC	Office		•								X	X														
Cisco	Office/Data		•			X	X									X				X	X					
2530 Arnold	Office		•	•		X													X							
50 Douglas	Office		•	•		X													X							
Echelon	Office		•	•		X		X		X	X									X	X					
GSA 450 GG	Office		•			X																				
GSA NARA	Archives		•			X																				
GSA Oakland	Office	•	•			X																				
Gilead 300	Office/Lab			•				X																		
Gilead 342	Office/Lab			•		X		X																		
Gilead 357	Office/Lab			•		X		X																		
Home Depot	Retail				•															X						
Irvington	High School			•		X											X									
IKEA	Retail			•		X																				
Kadent	Industry		•																					X		
Lafarge	Industry				•																					X
LBNL OSF	Office/Data			•		X											X									
Monterey	Office		•																	X						
NY Times	Office				•	X	X	X									X			X	X					
Oracle	Office			•		X				X																
OSIsoft	Office		•			X																				
Roche	Office/Cafeteria	•	•								X															
Rockefeller Center	Office				•				X				X									X				
Target	Retail			•							X									X						
UCSB Library	Library	•	•						X	X				X												
USPS	Postal		•	•											X				X							

Global Temperature Adjustment

- Demonstrated large sheds in existing DDC EMCS with minimal to no occupant issues
- Comply with comfort standards
- Oakland Federal Building, Sept. 8 2004
 - Average of ~800 kW, 0.8 W/ft² > 20% shed for 3 hrs. with two-step set point increase 72 F to 78 F



ASHRAE 55-2004

Time Period

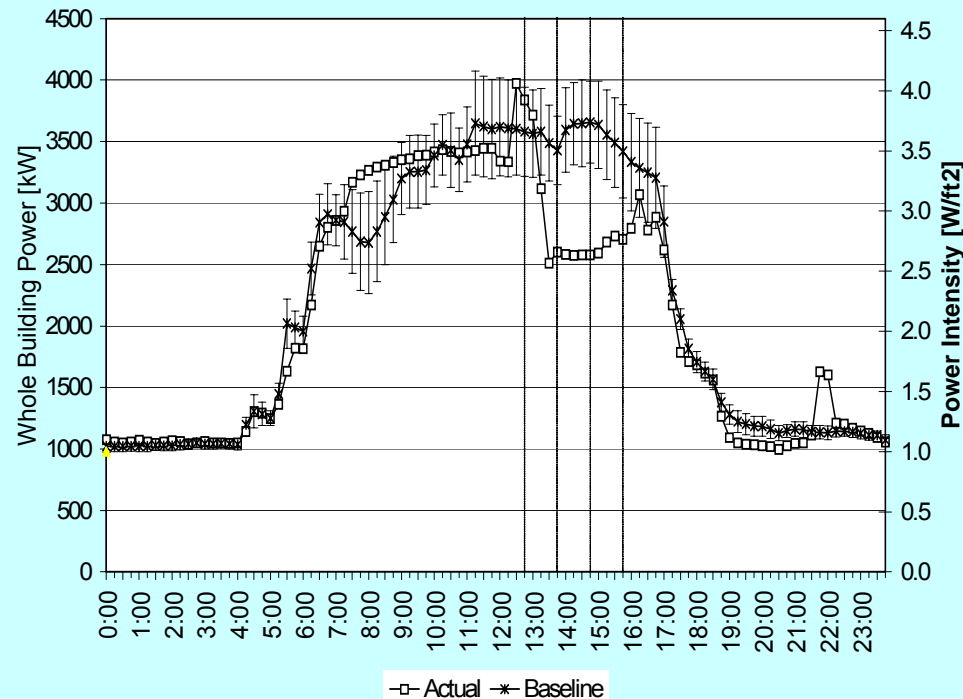
2 °F - 15 min.

3 °F - 30 min.

4 °F - 1 hr

5 °F - 2 hr

6 °F - 4 hr





Objectives of Summer 2006 Pilot Study

- Determine how automation of CPP can substantially increase its market penetration and subsequent savings in peak electrical demand.
- Determine if PG&E can offer fully automated DR programs

Timeline for Successful Participation

Activity	Date	Who
Recruitment, Sign MOU	May-June	PG&E & LBNL
Plan DR strategies, Establish connectivity	May - June	LBNL & Participant
Program DR strategies	May – July	Participant
Confirmation of Communication	May - August	LBNL & Participant
CPP Days	May - October	PG&E
Data Analysis and Write up	October - December	LBNL



LBNL needs Account Managers' Assistance in Site Recruitment

- **Initial contact with sites that are:**
 - In hot climates,
 - Already on CPP, and
 - Have some vintage of EMCS
 - Facility types not included in previous years
- **Explaining Pilot Study**
 - Request for Participation
 - Test Plan
 - Connectivity
- **Explain incentives**
 - Technology Incentives (TI) offered by PG&E
 - \$1,000 offered by LBNL after first successful participation
 - Bill protection
- **Signing on to the Pilot**
 - Memorandum of Understanding available at <http://drrc.lbl.gov/drrc-6.html>
- **Filling out surveys**
 - Site Survey
 - Cost Survey
 - Post-event Survey

Initial Contact with Sites

- Hot climates
- Varying building types
- Currently on CPP
- With EMCS

However, we are interested in working with sites with NO EMCS, where we can demonstrate direct control of equipment, and/or wireless controls.

Materials available:

- Request for Participation
- Test Plan
- Connectivity

Buildings by Type	2005	2006
Agric. Process.	-	
Schools/ Colleges	1	
Food Mfg. & Process.	-	
Heavy Industry	-	
Fabrication Industries	-	
Office Bldgs.	6	5
Lodging Facilities	-	
Hi-Tech Facilities	2	
Medical Facilities	-	
Process Industries	-	
Retail Store	2	1
Other (Museum)	1	1

Current confirmed participants:

Target (2) – ACWD – FUSD – Chabot

Gilead (3) – Echelon – Contra Costa (2)

Oracle – B of A



Incentives

Since each site programs their controls software, install hardware , and set up communication, the sites will incur costs. (Last year \$2-5K for each site.)

- **Technology Incentives (TI) by PG&E**
- **Technical Assistance by PG&E**
- **\$1,000 offered by LBNL**
- **Bill Protection for new CPP customers**

LBNL will provide a detailed study of DR strategy performance for each participating site.

Signing on...

If the site is already on CPP,

- Sign a Memorandum Of Understanding (MOU) – printable version available at <http://drrc.lbl.gov/drrc-6.html>
- Fill out a Site Survey – link to online survey available at <http://drrc.lbl.gov/drrc-6.html>
- LBNL will also collect cost of automation information and post-event evaluation information throughout the pilot study.



Links to important material

<http://drrc.lbl.gov/drrc-6.html>

The website includes brief description of the pilot study, contact information for LBNL and PG&E, and links to documents mentioned.



Next Steps for LBNL

- Contact Account Managers about possible sites currently on CPP
- Contact Controls Companies and coordinate involvement of some of their buildings
- Contact interested sites directly and refer them to their Account Managers to sign up for CPP

LBNL contacts:

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Q & A

- Questions?



Thank You!

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 - AS Consolidated Programs Sharepoint
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